

A Systematic Literature Review on Agility in Knowledge-Intensive Organizations

Gerald Stei¹, Levente Szász¹ and Alexander Rossmann²

¹Babes-Bolyai University, Cluj-Napoca, Romania

²Reutlingen University, Germany

Gerald.Stei@econ.ubbcluj.ro

Levente.Szasz@econ.ubbcluj.ro

Alexander.Rossmann@reutlingen-university.de

Abstract: Organizational agility may be an antidote against threats from volatile, uncertain, complex, or ambiguous corporate environments. While agility has been extensively examined in manufacturing enterprises, comparably less is known about agility in knowledge-intensive organizations. As results may not be transferable, there is still some confusion about how agility in knowledge-intensive organizations can be characterized, what factors facilitate its development, what its organizational effects are, and what environmental conditions favor these effects. This study closes these gaps by presenting a systematic literature review on agility in knowledge-intensive organizations. A systematic literature search led to a sample of 37 relevant papers for our review. Integrating the knowledge-based view and a dynamic capabilities perspective, we (1) present different relevant conceptualizations of organizational agility, (2) discuss relevant knowledge management-related as well as information technology-related capabilities that support the development of organizational agility, and (3) shed light on the moderating role of environmental conditions in enhancing organizational agility and its effect on organizational performance. This academic paper adds value to theory by synthesizing existing research on agility in knowledge-intensive organizations. It furthermore may serve as a map for closing research gaps by proposing an extensive agenda for future research. Our study expands existing literature reviews on agility with its specific focus on a knowledge-intensive context and its integration of the research streams of knowledge management capabilities as well as information technology capabilities. It integrates relevant organizational knowledge management practices and the use of knowledge management systems to ensure superior performance effects. Our study can serve as a base for future examinations of organizational agility by illustrating fruitful topics for further examination as well as open questions. It may also provide value to practitioners by showing what factors favor the development of agility in knowledge-intensive organizations and what organizational effects can be achieved under which conditions.

Keywords: Knowledge management, Knowledge-intensive organization, Organizational agility, Systematic literature review

1. Introduction

Organizations facing the challenge of operating in VUCA (volatile, uncertain, complex, and ambiguous) environments aim to develop agility. Such a capability allows them not only to adapt effectively to environmental changes but also to survive or even thrive under unpredictable conditions. In light of increased competition, organizations need to be able to “respond effectively to an incident that has occurred without warning, as well as [have] the ability to maintain a competitive leading position in today’s environment” (Lee and Yang, 2014, p. 207). The importance for organizations to achieve agility is also reflected in Aghina et al.’s (2020) recent study, which predicts that organizations with a high level of agility can achieve a 20-30% increase in financial performance.

A considerable amount of research deals with different forms of agility, such as marketing agility (Zhou et al., 2019), manufacturing agility (Lee et al., 2020), and healthcare agility (Mandal, 2018). Prior research has introduced different conceptualizations of agility, mainly focusing on its drivers, enablers, and effects (e.g., Walter, 2020). Accordingly, studies confirm that agility positively affects performance in unstable environmental conditions (e.g., Chan et al., 2017; Yang and Liu, 2012).

However, a topic that has received comparatively less research attention is agility in knowledge-intensive organizations (e.g., financial service providers, consulting enterprises). Such organizations use knowledge primarily as the means of production, the key difference from other organizations, which rely on labor and capital. Knowledge is their primary resource for addressing environmental challenges creating competitive advantage. Nevertheless, little is known about whether research insights into agility derived in a manufacturing context also apply to knowledge-intensive organizations. Therefore, examining this topic in detail is important to generate actionable insights for such firms.

This study examines organizational agility (OA) in a knowledge context. In line with prior research on the impact of knowledge resources on sustained competitive advantage (e.g., Eisenhardt and Santos, 2000), this study adopts the knowledge-based view (KBV). The KBV regards knowledge as the most important strategic resource

among enterprises and as a primary determinant of competitive advantage and performance (Grant, 1996). The KBV specifically recognizes competitive dynamics among organizations. To thrive, organizations need to create temporary advantages by leveraging their knowledge resources. This aspect is closely related to the concept of OA.

Lu and Ramamurthy (2011, p. 932) define OA as “a firm’s ability to cope with rapid, relentless, and uncertain changes and thrive in a competitive environment of continually and unpredictably changing opportunities.” OA involves sensing environmental changes and efficiently and effectively responding to such changes (Felipe et al., 2016). OA is typically regarded as a dynamic capability (e.g., Roberts and Grover, 2012), which refers to “the firm’s capacity to innovate, adapt to change, and create change that is favorable to customers and unfavorable to competitors” (Teece et al., 2016, p. 18). The dynamic capability framework complements the KBV, as it also relates to dynamic environments (Verma et al., 2017). In contrast with so-called ordinary capabilities related to operations and, therefore, to efficiency and thriving in the moment, dynamic capabilities reflect an organization’s “capacity to purposefully create, extend, or modify its resource base” (Helfat et al., 2007, p. 1).

There are at least three relevant gaps in current research on OA. First, literature lacks an overview of knowledge management-related antecedents of OA. Furthermore, while prior studies have stressed the role of information technology (IT) in achieving OA (e.g., Nejatian et al., 2018), the question of how knowledge-related IT factors can contribute to OA has not yet been fully explored. Thus, an analysis of this topic with respect to OA is worthwhile. Second, a summary of environmental conditions that favor the creation of OA as well as enhance its effects on organizational performance (OP) (e.g., Eckstein et al., 2015; Gligor et al., 2015) is missing. Third, to date, research has not provided an overview of open research issues related to OA in a knowledge-intensive context.

Addressing these gaps, we present a systematic literature review. By analyzing extant literature on agility at the organizational level, we aim to answer the following research questions: (1) How is OA conceptualized in current research? (2) What knowledge management-related (KMCs) as well as IT-related capabilities (ITCs) enable the creation of agility? (3) What is the moderating role of environmental conditions in the enhancement of OA? and (4) What are knowledge work-related gaps in OA research?

This study provides a concise overview on the topic of agility in knowledge-intensive organizations. It synthesizes prior research and presents conceptualizations, antecedents, and effects of OA on OP. Furthermore, it summarizes topics in need of further examination and suggests avenues for future research.

2. Research Method

This systematic literature review follows the suggestions of Durach et al. (2017) to guide its search efforts and to retrieve as well as synthesize relevant articles. As such, we performed a series of systematic steps. First, we created a framework for the phenomenon of interest. Prior research approaches OA as a dynamic capability (e.g., Roberts and Grover, 2012). Specifically, OA can be understood as a higher-order capability that is facilitated and enhanced by lower-order capabilities (e.g., Cai et al., 2013). Furthermore, we focus on OA in knowledge-intensive organizations. The unit of analysis refers to the organizational level of a firm. The focal object of the search was OA. As we were interested in the effects of OA on OP, and, in particular, the conditions under which these effects hold true, we included both aspects in the research framework. Another aim of the literature review is to examine the impact of different antecedents, in particular lower-order capabilities, that support the creation of the higher-order capability OA. Therefore, the framework includes KMCs and ITCs. Figure 1 shows our theoretical framework.

Second, appropriate inclusion and exclusion criteria must be created. We chose to include English-language articles on OA published in scientific journals. To be included in our analysis, the articles also had to be double-blind peer reviewed. Furthermore, they had to refer specifically to knowledge work or be applicable in such a context. In addition, the articles had to include at least two of the constructs in our research framework as displayed in Figure 1. Subsequently, we decided to exclude OA articles related primarily to a manufacturing context. Another exclusion criterion was the unit of analysis: articles that did not refer to the organizational level, but, for example, to a project level or enterprise network level, were not retained for further analysis.

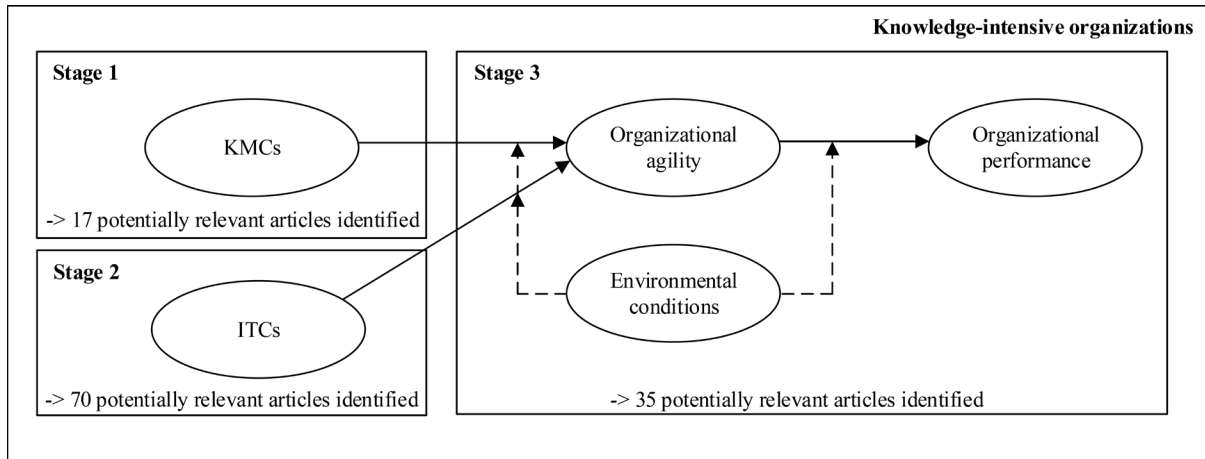


Figure 1: Research Framework

Third, to retrieve a baseline of potentially relevant articles, we conducted a systematic literature search in the Web of Science Core Collection database (Indexes = SCI-EXPANDED Timespan = All years) on all relevant aspects of the research framework. Figure 1 illustrates the logic of the search process, which comprised three stages. In stage 1, we scanned for work on knowledge-related antecedents of OA (17 articles). In stage 2, we searched specifically for studies on IT-related antecedents of OA (70 articles). In stage 3, we identified research on OA and OP (35 articles). After scanning the title, abstract, and body of each article, we eliminated publications that either did not meet our inclusion criteria or met our exclusion criteria (23 articles remained). Afterward, we conducted a forward and backward search to retrieve additional potentially relevant journal and conference articles. This led to a sample of 37 articles for the study.

3. Results

The results show that most articles on OA in knowledge-intensive organizations were published by scientific journals. Only 10.81% of the body of knowledge comes from publications of scientific conferences.

Our analysis also shows a dominance of quantitative research methods. A vast majority of the articles (75.68%) refer to a quantitative research design. By contrast, 16.22% of the articles are of a conceptual nature. Qualitative research methods are present in only 8.11% of the articles.

We chose to classify the search results into primarily knowledge management-related articles and primarily IT-related articles. The analysis shows that most articles focus on ITCs (24 articles) while only 13 articles examine the role of KMCs in creating OA.

With respect to conceptualizations of OA, the data show that a large body of published work describes OA as a multidimensional construct. Table 1 shows different conceptualizations of OA and its dimensions.

Two conceptualizations stand out, as they have been adapted from other studies. The first is the conceptualization of Sambamurthy et al. (2003), who describe OA as a three-dimensional construct. The dimensions comprise three forms of agility. First, customer agility involves “the co-opting of customers in the exploration and exploitation of opportunities for innovation and competitive action moves” (Sambamurthy et al., 2003, p. 246). This form of agility describes the interplay with customers in the creation of agility. Second, partnering agility is the “ability to leverage the assets, knowledge, and competencies of suppliers, distributors, contract manufacturers, and logistics providers through alliances, partnerships, and joint ventures” (Sambamurthy et al., 2003, p. 246). It focuses on the role of agility in organizational partnerships. Third, operational agility reflects “the ability of firms’ business processes to accomplish speed, accuracy, and cost economy in the exploitation of opportunities for innovation and competitive action” (Sambamurthy et al., 2003, p. 246). This aspect of agility describes the ability to create and use agility-suited business processes. A variety of studies have also adopted this three dimensional conceptualization of OA (e.g., Ashrafi et al., 2019; Felipe et al., 2020; Liu et al., 2018).

Lu and Ramamurthy (2011) also present an influential conceptualization. They differentiate between two dimensions. Market-capitalizing agility, or “a firm’s ability to quickly respond to and capitalize on changes through continuously monitoring and quickly improving product/service to address customers’ needs” (Lu and Ramamurthy, 2011, p. 933), refers to a mindset of embracing change in uncertain conditions. Operational

adjustment agility, or “a firm’s ability in its internal business processes to physically and rapidly cope with market or demand changes” (Lu and Ramamurthy, 2011, p. 933), focuses on flexible and rapidly responding operations within the organization.

Table 1: Selected Conceptualizations of the OA Construct

Source	Dimensions	Citations in Web of Science (Jan. 2023)
Chakravarty et al. (2013)	Entrepreneurial agility Adaptive agility	203
Lee et al. (2016)	Operation-level agility Strategic-level agility	8
Lee et al. (2015)	Proactiveness Radicalness Responsiveness Adaptiveness	159
Lu and Ramamurthy (2011)	Market-capitalizing agility Operational adjustment agility	512
Panda and Rath (2016)	Business process agility Market responsive agility	23
Park et al. (2017)	Sensing agility Decision-making agility Acting agility	97
Sambamurthy et al. (2003)	Customer agility Partnering agility Operational agility	1429
Ravichandran (2018)	Customer responsiveness Operational flexibility Strategic flexibility	149

The next step of the review focuses on the question of what lower-order capabilities enable OA. The results of the analysis reveal a variety of relevant capabilities. This study distinguishes between KMCs and ITCs.

KMCs have generally been stated to positively affect OA. An organization’s KMCs capture “its ability to mobilize and deploy KM-based resources in combination with other resources and capabilities” (Chuang, 2004, p. 460). KMCs play an important role in building OA, as they are a mechanism for mobilizing and deploying knowledge resources (Cai et al., 2013). A wide variety of studies have confirmed this positive impact of KMCs on OA (e.g., Cai et al., 2019; Chan et al., 2019; Mao et al., 2015). One study further differentiates between exploration KMCs and exploitation KMCs (Liu et al., 2014). Another knowledge-related capability refers to absorptive capacity, or a “firm’s ability to recognize the value of new information, assimilate it, and apply it to commercial ends” (Kale et al., 2019, p. 276).

ITCs capture “the ability of the firm to organize and employ IT-based resources in coordination with other organizational capabilities to better realize IT’s business value” (Panda and Rath, 2018, p. 2). Properly managed and deployed ITCs can provide tools that support the sensing and responding to environmental changes, which increases OA (Felipe et al., 2016). Prior studies have found a positive impact of ITCs on OA (e.g., Baloch et al., 2018; Chan et al., 2019; Lu and Ramamurthy, 2011; Ravichandran, 2018). The articles analyzed reveal a variety of additional IT-related capabilities, including managerial and technical IT capabilities (e.g., Tallon, 2008), IT infrastructure capabilities (Fink and Neumann, 2007), cloud infrastructure flexibility (Liu et al., 2018), and data analytics use (Ghasemaghaei et al., 2017).

Another scope of this research entails the moderating effects on the relationship between different types of capabilities and OA. The results reveal that only a minority of the articles describe moderating environmental conditions. The moderators described in prior research include uncertainty, dynamism, information intensity, diversity, hostility, and technology intensity of the industry. Table 2 provides an overview of these moderators and their effects on different OA-related relationships.

Table 2: Moderating Effects of Environmental Conditions on the Relationship Between Capabilities and OA

Moderator	Relationship	Moderating effect	Source
Environmental uncertainty	KMC-OA	Significant, positive effect	Mao et al. (2015)
Environmental dynamism	ITCs-OA	Significant, positive significant effect on IT competencies-entrepreneurial agility	Chakravarty et al. (2013)
Environmental dynamism	Technical IT capabilities-business process agility	Significant, negative effect	Tallon (2008)
Information intensity	ITCs-OA	No significant effect	Mao et al. (2015)
Information intensity	KMCs-OA	Significant, positive effect	Mao et al. (2015)
Environmental diversity	ITCs-OA	Significant, positive effect	Panda and Rath (2018)
Environmental diversity	KMCs-OA	No significant effect	Panda and Rath (2018)
Environmental hostility	ITCs-OA	- Significant, positive effect on ITCs-market responsive agility - No significant effect on ITCs-business process agility	Panda and Rath (2018)
Environmental hostility	KMCs-OA	- No significant effect on KMCs-market responsive agility - Significant, positive effect on KMCs-business process agility	Panda and Rath (2018)
Technology intensity of the industry	ITCs-OA	Significant, positive effect	Felipe et al. (2020)

Studies have also found a positive effect of OA on OP (e.g., Queiroz et al., 2018). Yet it makes little sense for organizations to strive for OA, no matter the price; rather, the development of OA is associated with cost for organizations (Teece et al., 2016). Therefore, the question arises under what conditions the enhancement of OA is reasonable. In other words: What environmental conditions favor the impact of OA on OP? The studies analyzed reveal a variety of conditions that serve as moderators of the OA-OP relationship.

Table 3: Moderators of the OA-OP Relationship

Moderator	Effect on OA-OP	Source
Technological turbulence	Significant, positive effect	Ashrafi et al. (2019)
Market turbulence	Significant, positive effect	Ashrafi et al. (2019)
Technology intensity of the industry	No significant effect	Felipe et al. (2020)
Industry setting	- Significant, positive effect of service settings on operation-level agility-OP - Significant, positive effect of manufacturing settings on strategic-level agility-OP	Lee et al. (2016)

The moderators in the articles include technological and market turbulence, technology intensity of the industry, and the industry setting (service vs. manufacturing enterprises). Table 3 displays moderators of the OA-OP relationship and describes their effects.

4. Discussions of the State of Research

Our analysis reveals a variety of conceptualizations of the OA construct. The two described conceptualizations of OA from Sambamurthy et al. (2003) and Lu and Ramamurthy (2011) have been cited by a multitude of articles. There is a consensus in literature that OA is best understood as a multidimensional construct. Researchers focusing on OA in knowledge-intensive organizations can build on existing conceptualizations and adapt the conceptualizations that best suit their research purposes.

We identified two capability-related antecedents of OA: KMCs and ITCs. Our results lend support to the view of the hierarchy of capabilities. According to this view, KMCs and ITCs are lower-order capabilities that enhance higher-order capabilities such as OA (Cai et al., 2013). When comparing KMC antecedents with ITC antecedents, we find that KMCs are quantitatively underrepresented. ITCs allow for an examination of relevant phenomena at a more detailed granularity and permit the differentiation of the concepts of interest. A similar development of KMCs is still missing in literature.

Studies have described different environmental conditions that act as moderators of the relationships between capability-related antecedents and OA. These refer to conditions that lead to a lack of predictability about the environment. Surprisingly, most studies do not account for environmental conditions. The same is true for moderators of the OA-OP relationship. This is unfortunate, because it means that studies do not regard the role of the environment.

5. Suggestions for Future Research

The state of current research opens up several pathways for future research on OA in knowledge-intensive organizations. Several questions on OA in a knowledge context still remain unanswered. This section provides ideas for future research and identifies research issues suggested in the articles analyzed in the systematic literature review.

Although several *conceptualizations* of OA exist in the literature, unexplored OA nuances still remain. A promising topic for researchers is the further development of the conceptualization and measurement of agility (e.g., Roberts and Grover, 2012). Moreover, an analysis of the specifics of OA in knowledge-intensive organizations in contrast with manufacturing organizations may help shed more light on the nature of OA in such contexts.

Prior research has identified a variety of capability-related *antecedents*, including KMCs and ITCs. However, this leads to the question of how these capabilities can be developed. The antecedents of these capabilities and the mechanisms in place should be subject to further examination (e.g., Lu and Ramamurthy, 2011). Another road for research lies in answering the question of how these capabilities interact to form OA (e.g., Mao et al., 2015). KMCs and ITCs may not only directly affect OA but also influence each other and therefore exert an indirect or joint effect on OA as well. An analysis of the joint effect of these capabilities might explore what mechanisms are at play and the impact of these effects on each other.

With respect to *environmental conditions*, our results show different environmental conditions and their effect on OA-related relationships. Future research might focus on hypothesizing and testing additional moderating effects. The identification of relevant moderators may be valuable (e.g., Cai et al., 2019; Felipe et al., 2020). An exemplary moderator that may be worth examining in a knowledge-intensive organizational setting is environmental ambiguity. The impact of different cultural backgrounds may also be a valuable topic for future studies. This could help account for the soft factors at play.

Regarding a general research design, the studies analyzed in this systematic literature review show different suggestions. We found that the majority of studies are of a quantitative nature. However, they mostly rely on cross-sectional data. A road for research could be to work with longitudinal data, which would allow for the identification of OA development over time (e.g., Baloch et al., 2018). In terms of data, further research could use objective data to quantify OA. Doing so could help avoid a bias in subjective (e.g., self-reported) data that may influence the results (e.g., Cai et al., 2019).

Applying complementary research methods might also be of value when examining OA (e.g., Chan et al., 2019; Lee et al., 2016). For example, research suggests the use of experimental research designs to examine causal relationships (e.g., Panda and Rath, 2016). Another method that would allow for a deeper examination of OA is case study research (e.g., Tallon, 2008).

6. Conclusion

Our study provides a concise overview of research on agility in knowledge-intensive organizations and synthesizes previous results. It differs from existing literature reviews (e.g., Tallon et al., 2019; Walter, 2020) in three respects. First, the study focuses specifically on agility in knowledge organizations. Second, it provides an overview of conceptualizations of OA and summarizes the impact of environmental conditions that influence the creation of OA. Third, it presents open research questions and describes a map to guide future research. Overall, this research addresses the question of what organizational impact knowledge management exerts. This literature review may build the base for further explorations of the performance impact of KMCS together with ITCs.

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